by the progressive cooling of the air, since the mass of water that results from the cooling of, say, a kilogram of saturated air from 15° C. to 0° C. is constant (rather more than 5 gr.), whether or not supersaturation may have existed at the inception of the temperature-reduction.

Having thus pronounced upon the theories which have been advanced to account for the alleged connection, M. Angot goes on to consider whether in reality anything has occurred that needs accounting for—whether the rainfall since the outbreak of hostilities has been less inclined to observe the rules by which we endeavour to forecast its occurrence than before. Careful comparison between the daily weather-maps and the observed rainfall figures has convinced him that it is not. He points out, very rightly, that we have been passing through a series of wet years since 1909—a period that balances the run of dry years 1898–1904 (1903 and 1911 were both exceptions to their groups and may be said to balance one another)—and that excess of rain in 1915 and 1916 might reasonably have been expected; that 1909 was wetter (in France) than 1915, 1910 than 1916; furthermore, that during December, 1915, an unprecedentedly wet month, relative calm prevailed over the whole front, and that in the second ten-day period of the very wet February of 1916 considerably more rain fell (40 mm. as against 28 mm.) than in the last ten-day period, which witnessed the development of the giant German bid for Verdun. Similar conclusions will be reached if frequency of rain instead of amount be considered: 1910 had more rain-days than 1916; 1912 and 1913 both more than 1915, when the number in France was eleven below the average. The author has found nothing exceptional in the local distribution of rainfall: proximity to the firing-zone has not resulted in relatively greater totals or frequencies, while the great spring offensive of 1917 failed to interrupt the long spell of brilliant weather which accompanied it.

An examination was made some months ago at the British Meteorological Office into the local distribution of rainfall over England during the first twenty-two months of the war, the results of which afford corroborative evidence for M. Angot's last-mentioned point. It was found that the greatest excess of rain over the normal figure was one of 59 per cent. on the South Yorkshire coast; that three areas in Lincolnshire and on the Norfolk and Suffolk coasts respectively had rather more than 40 per cent. excess; but that round the North Foreland there was a slight deficit. No trace whatever of a distribution having reference to a centre over northern France was discoverable.

M. Angot concludes with the reflection that it may be with rainfall and gunfire as it is with weather changes and the phases of the moon, that "sous la suggestion d'une croyance instinctive on est conduit involontairement à ne remarquer que les coïncidences favorables et à s'affermir ainsi de plus en plus dans cette croyance." For those, indeed, who are cognisant of the relationship between the weather and modern warfare it is not difficult to see the possibility of the connection, but it is a connection in which the amount of gunfire varies inversely as the amount of rain that is falling rather than one which makes the rainfall in any way dependent upon the gunfire.

E. L. HAWKE.

NOTES.

M. PAUL OTLET, who is director of the International Institute of Bibliography at Brussels, has published a long and interesting memoir in the May–June number of the *Bulletin de la Société d'Encouragement pour l'Industrie Nationale* on the question of the establishment, in Paris, of a Central Information and Records Office for Industry. There are already in existence a certain number of enterprises of the kind, such as the *Mois Scientifique et Industriel* in France, the *Engineering Index* in England, and the *Repertorium der technischen Wissenschaften* in Germany, but their scope is limited. According to M. Otlet, the scheme should assume an international character, and its functions should be the collection, classification, and dissemination of all information available, both French and foreign, which will tend to facilitate and develop industry. A mere catalogue of works on particular subjects is not alone sufficient; a bibliography should be included in the scheme, so as to afford more detailed information on any desired subject. Books of all kinds, pamphlets, catalogues, descriptions of processes, journals, standard reference books of all countries, plans of machinery and plant, where available, a complete set of patent specifications, prospectuses of educational establishments, etc.—all would be collected and classified in accordance with a plan definitely laid down beforehand. Extensive card or similar indexes would be compiled for reference, and a complete catalogue on the decimal system, together with a bibliography, would be published at definite intervals. All these works would be available for free consultation by interested parties. Authors and publishers would be invited to co-operate in order to ensure the success of the enterprise. Existing publications, *e.g.* the International Catalogue of Scientific Literature, would be used as the nucleus of the work. It is to what the author calls the science of "documentation" that the Germans owe to a great extent the place they have attained in the industrial and military world, although they have often employed unscrupulous means to reach their end. He suggests that every industrial concern should have its own information and records department, which should be planned on the same lines as the national establishment, with which it should keep in touch. In connection with the question of patents, it was suggested at the Conference of Allies held at Paris last year that an international patent office be formed after the war, to save the time and expense now required for taking out patents in various countries. An undertaking of this nature would greatly increase the necessity for a more elaborate—practically an international—Record and Information Office to enable all questions of priority and infringement to be dealt with efficiently. Every phase of an important subject is reviewed in this memoir of thirty pages.

WITH a view to the just apportionment of pensions due to soldiers for injuries received in the present war, the French Government has established at Paris, at the instigation of Dr. Camus, a well-known military surgeon, a special centre for determining scientifically the extent of incapacitation. This establishment will serve both as a research laboratory and for the additional treatment of those who have already undergone the usual hospital treatment. Here special measurements are carried out with instruments designed by Dr. Camus, these measurements having reference to (1) the anatomical condition, and (2) the physiological function of the injured part. The special instruments include those for measuring the movements of the joints, a special dynamo-ergograph for studying small movements, a device for recording vaso-motor disturbances, and an apparatus for recording trembling. The methods of this laboratory permit of replacing the long descriptions of specialists by documents of a more complete and scientific nature, *i.e.* photographs, numerical tables, curves, etc., which can only be interpreted in one sense. The insurance companies are interesting themselves in this new method of determining bodily efficiency, and hope to employ it in all cases of disputes arising out of compensation awards for accidents. The writer of the article in *La Nature* for July 28 (from which this note is derived) hopes that this system of evaluation will prevent exaggerated claims and make for equity of treatment as regards the pension to be paid to the partially disabled.

IT is stated in the *Scientific American* that Dr. G. Müller has been appointed director of the astrophysical observatory at Potsdam, in succession to the late Prof. K. Schwarzschild.

THE Baly medal of the Royal College of Physicians of London has been awarded to Prof. W. M. Bayliss, and the Bisset-Hawkins memorial medal to Sir A. Newsholme.

THE Edward Longstreth medals of the Franklin Institute have been awarded to Prof. A. E. Kennelly and Messrs. F. H. Achard and A. S. Dana, for their joint paper on "Experimental Researches on the Skin Effect in Steel Rails."

ACCORDING to a telegram from Wellington, New Zealand, a violent earthquake has occurred in the southern portion of North Island, causing great damage. The Wairarapa district suffered most. The earthquake is described as the worst since the upheaval in the 'fifties.

WE learn from *Physis* that Dr. G. R. Wieland, of Yale University, U.S.A., has spent the last season in collecting fossil plants in the Argentine Republic. He has paid special attention to the Rhætic formations of Mendoza and the Lias of Neuquen.

THE Rockefeller Foundation, with the co-operation of the Philippine Government, is sending a hospital ship to the Moros and allied tribes of the Sulu Archipelago. It is intended that the ship shall cruise for five years among the many islands in the southern Philippine group, the Rockefeller Foundation having learned that many of the Moros are suffering from skin diseases, malaria, hookworm, dysentery, and other diseases.

A SPECIAL series of preparations has just been placed on exhibition at the Horniman Museum, Forest Hill, S.E., to illustrate the stages in the life-histories of numerous insects which damage the food plants grown in gardens and allotments. Specimens and models showing the damage done are also exhibited, and means of combating the pests indicated. Visitors to the museum may obtain there copies of the leaflets of the Board of Agriculture dealing with the insects shown.

EXCEPTIONALLY heavy rains occurred over the east and south-east of England during the closing days of July and on the opening days of August. For the four days from July 30 to August 2 inclusive the rains were heavier in many parts of London than for any similar period for the last twenty-five years. At South Kensington, the recording station of the Meteorological Office, the measurement for the four days was 3·28 in., which is 70 per cent. of the average London fall for July and August combined. According to the weather reports from the health resorts the rainfall at Southend was 3·44 in., which is 89 per cent. of the average fall for July and August, and at Margate 3·48 in., being 84 per cent. of the average for the two months. At Hastings the rainfall measured 3·16 in., at Eastbourne 2·60 in., and at Bournemouth 2·00 in. In the northern and western parts of England the rainfall was slight, and in the midlands it was by no means heavy. The subsequent rains in the south-east of England have been frequent, but not heavy. During the period of the heavy rains the temperature was very low for the time of year, and on several days the midday temperature remained below 60°. The disturbances which occasioned the rains in England also caused very wet weather in Flanders and other parts of north-western Europe.

IN *Science Progress* for July Prof. Flinders Petrie contributes a valuable paper on "History in Tools." He points out that while there are many books on offence and defence, arms and armour, there is none that traces the history of our mechanical aids. Thousands of writers have described the sculptures of the Parthenon, but not one has described the means used in performing that work. It is a mystery to us how fluted columns with an entasis could be produced, true to a hundredth of an inch, in the diameters between the deep groovings. He goes on to describe the evolution of tools from the age of Stone to that of Iron, and he sums up the discussion in the following words:—"Thus the spread of forms throughout the ancient world illustrates the movements of trade and of warfare, while the isolation of various types at the same time shows how efficient and self-supporting the ancient civilisations were in most requirements. The history of tools has yet to be studied by a far more complete collection of material, above all of specimens exactly dated from scientific excavations. It will certainly be, in the future, an important aid in tracing the growth and decay of civilisations, the natural history of man."

THE report of the Somerset Archæological Society is, in spite of difficulties caused by the war, which have impeded the excavations at Glastonbury, a record of steady progress. The great work of the year is the completion of the report of excavation of the Lake Village at Glastonbury, on which Dr. A. Bulleid and Mr. St. George Gray are to be congratulated. The society has wisely organised an advisory committee on church restorations in the county, which will, it may be hoped, secure the protection of ancient ecclesiastical buildings, and prevent any proposed restorations which threaten to destroy their archæological value.

IN the July *Quarterly Review* there is a clearly written and shrewd article on the problem of degeneracy by Dr. A. F. Tredgold. He defines degeneracy as "a retrograde condition of the individual resulting from a pathological variation of the germ-cell," and suggests that the word "decadency" might be used to denote the somatic modification arising from a defective environment. Any usage which will keep two distinct conditions from being confused with one another will be a gain in thought and action. To prevent hereditary retrogressive variations being continued and diffused is the problem of restrictive or negative eugenics, but can we not discover how they arise? (1) Some investigators—*e.g.* Dr. C. B. Davenport—believe that feeble-mindedness means a perpetuation of a distantly ancestral or Simian condition. But feeble-mindedness as we know it does not look like a stage in an evolution that went on! Mosckoff is more explicit. He traces all degeneracy and much else to the persistently assertive influence of a Pithecanthropus strain, which unfortunately got mixed up long ago with that of "white diluvial man," who seems to have been a sort of Apollo. (2) Another so-called theory is that retrogressive variations are fresh "spontaneous" sports, bad shots on the part of the changeful germ-plasm. But there are few who are inclined to rest satisfied with the word "spontaneous," which is only a confession of ignorance. (3) So the third view is that retrogressive variations arise as variations conditioned by a disturbing, depressing, or deteriorating immediate environment, such as toxic conditions of the parent, which may induce senescence or enfeeblement in the germ-cells. The author might have referred with effect to the striking experiments of Werber, which show how toxic agents, like butyric acid and acetone, produce no end of monstrosities in the developing fish-embryo. Perhaps, as Werber suggests, parental metabolic toxæmia higher up in the scale may account for degeneracy in the offspring. Dr. Tredgold directs attention to the fact that the chief expression of degeneracy occurs in the most elaborate, and phylogenetically the most recent, part of the organism—namely, the higher parts of the brain. From his own experience, he notes that all the offspring of two markedly degenerate persons are always defective, and that those resulting from the union of a pronounced degenerate with a healthy individual tend to be, not some normal and some abnormal, but all abnormal.

IN the *Revue Scientifique* for July 14–21 M. André Godard directs attention to the important services rendered by birds to agriculture. The depredations of insects on cultivated crops, both at home and abroad, he points out, are so serious that it is well that we should realise their extent and the good that is done by truly insectivorous species of wild birds. The opinions of many authorities are quoted, and figures given in support of their various statements, which show that enormous numbers of insects, insect larvæ, and eggs are annually destroyed by birds, which, if permitted to live, would make profitable cultivation impossible. M. Godard is of opinion that although many species may appear to be injurious, they are really beneficial when the nature and quantity of their food are carefully considered. He seems to regard the situation as one in which we must be content to put up with a small amount of damage by birds or absolute disaster due to injurious insects. Whilst fully agreeing with all the author claims for the truly insectivorous species, we must differ from him in regarding the damage done as small, and bearing in mind that the truly injurious species are comparatively few in number, we think that agriculture will best benefit by the elicitation of a thorough and detailed knowledge of their feeding habits and the nature of their food throughout the whole of the year, and the enactment of wise measures for the destruction of such species as are known to be too plentiful. We believe that in France, as in Great Britain, many of the insectivorous species of wild birds have suffered owing to the unrestricted increase of the commoner and injurious species, and the situation is one that will not improve by neglect or by the shutting of one's eyes to the actual facts.

THE *Scottish Naturalist* for July–August is entirely devoted to the report on Scottish ornithology in 1916 by the Misses Leonora Rintoul and Evelyn Baxter. This in every way maintains the high standard of their reports of former years. One of the most striking of the many good things they record concerns the herring-gull, nesting on the cliffs at North Uist and the Skerries. After building their nests, which they seem to have done in normal numbers, very few of them laid eggs, and fewer still hatched out young, not more than a dozen being brought off where there used to be scores. So far no explanation of this state of affairs is forthcoming, though it was believed, in the case of the North Uist birds, that this failure was due to the plague of rats which infests the cliffs there, but it is clear, they remark, that this explanation fails. The presence of rats in such conspicuous numbers on cliffs facing the sea is in itself a noteworthy fact, and should be kept under observation. "One of our correspondents," they write, "records about twenty pairs of red-necked phalaropes." But the precise breeding-place of this bird is rightly withheld. Another note concerns the spotted flycatcher, eight or nine of which were watched catching flies over a big pool in the Malzie Burn, Corsemalzie, where one of them was seen to alight several times on the still water.

MR. N. HOLLISTER, superintendent of the National Zoological Park, Washington, in the Proceedings of the United States National Museum, vol. liii. (June), records some valuable notes on the effects of environment and habit on captive lions, which will be read with interest, not only by those desirous of obtaining data of this kind, but also by such as are responsible for the selection of specimens for museums. The author shows clearly enough that captivity produces very marked changes, both in the coloration and length of the pelage and in the skeleton, particularly in the skull, where the regions affected are chiefly the areas of origin for the muscles concerned with the seizing of the prey and with certain of the masticatory muscles. Further, the brain capacity in captive lions is much less than in wild specimens.

THE April issue of the *Agricultural Journal of India* (vol. xii., part ii.) contains two notes from different sources on materials said to be now used in Germany as substitutes for jute, and their probable significance as future competitors with Indian jute. Waste paper and cellulose are dismissed as unlikely to be more than war-time substitutes, but a more serious view is taken of the possibilities of the two plants, *Epilobium hirsutum* (hairy willow herb) and Typha (reedmace), which are said to be now utilised for fibre by the Germans. The opinion is expressed that the former is unlikely, for some time at any rate, to prove a serious competitor, owing to the necessity for prolonged cultural improvement of the plant before good fibre-producing strains can be evolved. Typha fibre, according to a quotation from the *Chicago Daily News* of October 1, 1916, would appear to be a more formidable competitor. It is claimed in Germany that this material, "if it meets with expectations," will make Germany independent of the importation of cotton, jute, and wool, and the further assertion is made that Germany so early as next year will make enough of the material to equal all the supplies usually imported, largely from America and Egypt. Capital for the exploitation and manufacture of this material has been subscribed by "the greatest spinners, merchants, and bankers of Germany," and attention is being directed first to the development of the coarser grades of material.

THE June issue of *Tropical Life* contains a review by Mr. H. C. Brill, of the Bureau of Science, Manila, of the outlook for the alcohol industry in the Philippines and the tropics generally. Three of the cheapest sources of alcohol occur in the tropical countries, namely, sugar-cane molasses, "tuba" from the nipa palm, and possibly from the coconut palm, and starch from the starch plants, such as cassava and arrowroot.

The two former sources are already utilised to a considerable extent, the second largely predominating. In 1914 the islands produced about 12,000,000 proof litres of alcohol, of which more than 95 per cent. was made from the sap (tuba) of the nipa and of the coco palms. The molasses fermentation industry has suffered much from faulty methods, but considerable improvement is being effected through the activities of the Bureau of Science. The nipa palm offers a cheap source for the production of alcohol, each fruiting stalk yielding normally 30 to 50 litres of sap during a season, equivalent to an output per hectare of fully 30,000 litres of juice with an average sugar-content of 15 per cent. The utilisation of starch plants still awaits development. It is estimated that an average acre of cassava would yield more than three times as much starch as an average acre of maize, whilst, in addition, the cassava contains 4 to 6 per cent. of fermentable sugars. Arrowroot yields 18 to 22 per cent. of starch, and is no more difficult to handle than potatoes. It is predicted that when these sources are developed the tropical countries will secure a practical monopoly of the alcohol industry.

The thickness of a covering of peat is often cited as giving some clue to the age of the surface on which it grew. Mr. S. R. Capps's recent remarks ("The Chisana-White River District, Alaska," Bull. 630, United States Geological Survey, p. 72) are thus of general interest. He points out that a seedling spruce sends out its first radial roots on the mossy soil, and, in a high latitude, follows these by others at higher levels, as the moss thickens and the food-supply from below is cut off through the rising of the level of ground frost. Hence, under such conditions, "the vertical distance between the lowest horizontal roots of a living tree and the surface of the ground represents the thickness of the peaty accumulation during the lifetime of the tree." Mr. F. V. Coville has informed Mr. Capps that trees of very slow growth may fail during unfavourable years to form distinct annual rings, and that the estimate of the age of the peat-layer by the age of the trees must take this into consideration.

Mr. W. G. Foye, in a paper on "The Lau Islands of the Fiji Group" (*Amer. Journ. Sci.*, vol. xliii., p. 343, 1917), concludes that there is here positive evidence of subsidence, and very good evidence of the development of atolls and barrier reefs during such subsidence. He regards, however, a general depression of the Pacific area as unlikely, owing to the irregular occurrence of uplifted and subsided blocks.

Mr. J. Coggin Brown continues his description of "The Geology of the Province of Yünnan in Western China" in the Records of the Geological Survey of India, vol. xlvii., p. 205. The Silurian fossils collected have been determined by Mr. F. R. Cowper Reed, of Cambridge. The paper, with its foundation of hard travel, and its geographical observations interspersed with details of stratigraphy, reminds one of those of the pioneers of the last century, and the illustrations show what fine adventure awaits the surveyor on the borderlands of the British Empire.

The Riviera or Ligurian earthquake of February 23, 1887, was one of the first earthquakes instrumentally recorded beyond the limits of the disturbed area. In the early estimates of the velocity there was considerable discordance, and a new estimate has therefore been made by Messrs. Agamennone and Cavasino (*Rend. della R. Acad. dei Lincei*, vol. xxvi., 1917, pp. 167–71). Taking the position of the epicentre as about 20 km. south of P. Maurizio, and using the twenty-eight best estimates in which the initial epoch is given, they find the mean velocity to be 2·54 km. per second, and the time at the epicentre 6h. 21m. 9s. a.m.

Prof. Omori's fifth memoir on the recent eruptions of the Asama-yama (Bull. Imp. Earthq. Inv. Com., vol. vii., No. 2, pp. 217–326) contains a list of the earthquakes and earth-tremors registered at Yuno-taira during the six warmer months (May to October) of each year from 1913 to 1916. This seismological station is situated on the west-south-west slope of the volcano, at a distance of 2·3 km. from the centre of the crater. As in his earlier memoirs, Prof. Omori divides the volcanic earthquakes into two types—the A-type, not directly accompanied by outbursts, and the B-type, caused by eruptions. The former consist of quick vibrations and are usually of very short duration, the latter of slow gentle movements and of comparatively long duration. The tables show, as Prof. Omori remarks, that the former earthquakes have increased in frequency from 34 in 1913 to 229 in 1916, while the latter have declined from 7126 in 1913 (all but 25 corresponding to very small outbursts) to none in 1915 and 2 in 1916. Since May 5, 1914, there has been no strong outburst of the Asama-yama.

A new acid sodium phosphate is described by Dr. J. H. Smith in a recent number of the Journal of the Society of Chemical Industry (vol. xxxvi., No. 8). The formula attributed to it is $Na_4P_6O_{17}$, or $6Na_2O,9P_2O_5$. It is notable as having a very energetic corrosive action upon glass, porcelain, nickel, and even platinum and silica. The author describes also a method for the titration of mixed phosphates by employing two indicators, methyl-orange and phenolphthalein, at 55° C., and shows that by this means it is possible to determine readily the proportions of the three sodium salts of orthophosphoric acid when present together in a mixture.

Some lines of possible research, with a view to the better utilisation of by-products from the coking of coal, are outlined by Mr. G. E. Foxwell in a recent number of the Journal of the Society of Chemical Industry (vol. xxxvi., No. 10). Recovery of sulphur from the pyrites of the coal, so that, together with the ammonia given off in coking, it could be obtained as ammonium sulphate is one of the problems to which a solution is required. Where the chlorine content of the coal is sufficiently high, it also may be recovered with the ammonia in the form of ammonium chloride, and in a few cases this is, in fact, already done. Improved methods for the recovery of naphthalene and benzol are required, as also for the utilisation of the surplus gas from the coke ovens. This gas, the author calculates, is equivalent to more than a million tons of coal per annum, and in a great number of cases is got rid of by being allowed to burn away. It might possibly be used as a source of certain chemicals—*e.g.* chlorinated hydrocarbons—or utilised in gas-engines to generate electricity for distribution, or the gas itself might be distributed in mains to neighbouring towns.

In the issue of *La Nature* for July 14, M. Le Chatelier gives a brief survey of the progress of high temperature measurements. He points out the main causes of error that are likely to arise in using the thermo-electric type of instrument, though, as he remarks, troubles have been largely eliminated by the use of improved types of galvanometer of the moving coil pattern. Great care is required in the graduation of the instruments, and frequent regraduation is necessary. One of the great advantages of the thermo-electric pyrometer is that it lends itself readily to photographic recording. A spot of light from a slit or hole is allowed to fall on to the mirror of a mirror-galvanometer, whence it is reflected on to a sensitised plate This method is frequently used nowadays in investigating the critical points of steel. The writer mentions the recording apparatus thought out by M. Saladin, which permits of tracing all kinds of curves on a photographic plate by using two mirrors both capable of rotation about a vertical axis and operated by two galvanometers. A fixed mirror, inclined 45° to the horizontal, is placed between the two moving mirrors. The ray of light reflected by the first mirror is thus given a horizontal movement, which becomes vertical after reflection by the fixed mirror at 45°. It is then reflected on to the second mirror, which imparts to it a second and final horizontal displacement. Finally, the combination of these two perpendicular movements traces a curve on a stationary photographic plate. It is thus possible to plot directly curves of electric resistance, of dilatation, and of E.M.F. in terms of temperature.

IN view of the importance of internal waterways and of the many questions which revolve round the development of the hydraulic resources of their country, the National Association of Navigation Congresses in Italy has inaugurated the publication of a small periodical of eight pages, known as *Navigazione Interna,* to deal with matters of interest in that connection as they arise. The first issue, for May, 1917, lies before us and contains an account of the work of the Hydrotechnical Institute at Stra, associated with the University of Padua and the Hydrographic Department at Venice, describing in particular the experimental tank 200 metres (656 ft.) long, with a bottom width of 3·70 metres (12 ft.), a top width of 10·75 metres (35¼ ft.), and a mean depth of 3·50 metres (11½ ft.). The tank is constructed in cement concrete, with light metal reinforcement, and is fitted with a moving platform and the appropriate mechanical equipment. The institute undertakes experimental work in connection with all hydraulic problems, including those in regard to the resistance offered to the movement of solid bodies in water. Another interesting article in the journal deals with a Swiss project of a navigational connection between Lake Maggiore and the River Po. We welcome the advent of this latest recruit to the service of hydrological science.

EVIDENCE of the difficulty of destroying reinforced-concrete buildings is given in an article on concrete in war in the *Times Engineering Supplement* for July 27. Steel cupolas have been blown to fragments by high-explosive shells, while similar structures in reinforced concrete have survived the ordeal with comparatively little injury. Many of the reinforced concrete buildings plentifully scattered over Northern France have been used by the Germans as well as by ourselves, and have shown remarkable capacity for withstanding artillery fire. One case quoted is of an elevated reservoir measuring about 80 ft. long, 40 ft. wide, and 12 ft. deep, supported on a framework of thin columns more than 40 ft. high, with horizontal bracings. The flat roof at a height of 55 ft. was used by the Germans as a ready-made observation post. This reservoir, built in June, 1911, of Hennebique ferro-concrete, was destroyed so far as possible when the Germans evacuated the town in March last, having successfully withstood our bombardment, which destroyed all surrounding buildings. The columns were broken by explosives, allowing the reservoir proper to fall to the ground, where it remained intact save for a few cracks and holes cut in the corners, where explosives had been inserted with the object of trying to damage the walls.

OUR ASTRONOMICAL COLUMN.

DISCOVERY OF A NEW STAR.—According to the *Times* of August 6, the discovery of a new star by Mr. Ritchey on July 19 has been announced by Prof. Pickering. The star is very faint, being of the 14th magnitude, but it may be of special interest because of its situation in the nebula N.G.C. 6946. This is a large faint nebula in Cygnus, its position being R.A. 20h. 33m. 17s., decl. +59° 51′.

STELLAR MOTIONS AND ABSOLUTE MAGNITUDES.—The relationship of stellar motions to absolute magnitudes has been further investigated, as regards 1300 stars of types F, G, K, and M, by W. S. Adams and G. Strömberg (*Astrophysical Journal,* vol. xlv., p. 293). Parallaxes determined by the spectroscopic method were available for about 700 of the stars used, and these were supplemented by others derived with the aid of a new formula connecting mean parallax with proper motion. From the parallaxes and apparent magnitudes, the absolute magnitudes are easily calculated, being defined as apparent magnitudes reduced to the distance corresponding to a parallax of 0·1″. The stars being divided into groups defined by certain limits of parallax, it is first shown that among stars at the same distance from the sun there is an increase of radial velocity with decrease in absolute brightness, and that there is little evidence of any variation in radial velocity depending upon distance from the sun. For the spectral types considered, the increase in velocity is 1·5 km. for a decrease in brightness of one magnitude. It is shown that this effect cannot be ascribed either to distance from the sun, to the law of frequency-distribution of the velocities, or to the effect of stream motion. The same conclusion is reached with regard to the cross linear motions of the stars, and it appears to hold in the mean for apparent as well as for absolute brightness The stars of types K and M have mean velocities about 1·0 to 1·5 km. higher than the F and G stars of the same absolute magnitude.

UNION OBSERVATORY, JOHANNESBURG.—Circular No. 37 of the Union Observatory includes measures of ninety-eight double stars and the results recently obtained by the blink microscope in connection with proper motions and new variable stars. On twenty-three pairs of plates taken at the Melbourne Observatory, at intervals averaging about twenty years, 104 proper motions were found and measured, twenty-three of the stars having a centennial proper motion of 20″ or more; fifty-six of these stars have a motion nearly parallel to the galactic plane and towards the solar ant-apex. Proper motions amounting to only 0·04″ or 0·06″ a year were easily and certainly determined. A disagreement with the results from astrographic measurements in the case of three pairs of plates taken at the Cape Observatory has led to an interesting correspondence with Prof. Kapteyn. The general impression obtained by Mr. Innes from his work with the blink microscope is that practically all stars, nebulæ, and clusters in any one region are at the same distance from us, and that with very few exceptions they are all relatively fixed. In Circular No. 38 Mr. Innes announces an important undertaking in the form of a photographic map of the southern sky, from the Franklin-Adams star plates. Each chart will be ruled with hour circles and parallels, and will cover a little more than 30 square degrees, the scale being 36 mm. to 1°. The region to be covered will require 556 charts. An excellent specimen chart accompanies the circular, and others will be issued as opportunity offers.